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Xiaofeng Guo

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INTEL/BSTZ

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EXAMINER

WEI, ZHENG

ART UNIT

PAPER NUMBER

2192

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/582,204	Applicant(s) GUO ET AL.	
	Examiner ZHENG WEI	Art Unit 2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>1/12/2007, 12/11/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the application filed on 06/08/2006.
2. Claims 1-19 are pending and have been examined.

Oath/Declaration

3. The Office acknowledges receipt of a properly signed oath/declaration filed on June 08, 2005.

Priority

4. This application claims benefit of PCT/CN06/00162 filed on 01/26/2006.
Therefore, the priority date considered for this application is January 26, 2006.

Information Disclosure Statement

5. The information disclosure statements filed 01/12/2007 and 12/11/2008 have been placed in the application file and the information referred to therein has been considered.

Drawings

6. The drawings filed on June 08, 2006 are accepted by the Examiner.

Examiner's Notes

7. Examiner cites particular columns and line numbers in the references as applied to the claims below for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that, in preparing responses, the applicant fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

Claim Objections

8. Claims 16-19 are objected to because of the following informalities:
Claim 16 recites "A machine-accessible medium" and dependent claims 17-19 recite a different term "The machine readable medium". Examiner reads them as same type of medium.
Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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10. Claims 2, 5, 6, 10 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2:

Claim recites “a block includes a computer program instruction” in line 1. It is not clear to examiner the “a block” is one of the plurality of blocks or each one of the plurality of blocks as defined in independent claim 1. For the purpose of compact prosecution, examiner treats term “a block” as – each one of the plurality of blocks --.

Claims 5, 6 and 10:

The above claims recite term “determining to the extent the critical section”. It is not clear to examiner what to determine to. For the purpose of compact prosecution, examiner treats it as – determining the extent of the critical section - -.

Claim 14:

Claim 14 recites term “determines a critical section and to the extent a critical section”[emphasis added]. It is not clear to examiner the two “a critical section” are same or different. For the purpose of compact prosecution, Examiner treats it as -- determines a critical section and the extent of the critical section --.

Claim Rejections - 35 USC § 101

11. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

12. Claims 9-12 and 16-19 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 9:

Claim 9 recites a computer implemented system, which comprises a computer program organizer, a critical section determination module, a dependency graph construction module and a dependency relationships inserter. Such claimed software module/organizer is software program listings per se and it does not define any structural and functional interrelationships between the computer program and other claimed elements of a computer, which permit the computer program's functionality to be realized. Therefore, claim 9 is not statutory. See MPEP 2106.01(I)

Claims 10-12:

Claims 10-12 depend on claim 9. These claims all fail to remedy the 35 USC 101 nonstatutory problem of claim 9. Therefore, they are also rejected for the same reason.

--These rejections can be overcome by adding computer hardware components e.g., memory, and processor into the claims that permit the computer program's functionality to be realized.

Claim 16:

Claim 16 recites a machine-accessible medium in page 18, line 1 of the claim which is defined in the specification including "...transmission over the Internet" (see for example, paragraph [0056]). The transmission medium e.g. signal or wave is only a form of energy that is not a tangible physical article or object and it does not fall within either of the two definitions of manufacture. Thus, under the Interim Guidelines such media do not fall within one of the four statutory classes of 35 U.S.C 101 Annex IV (c). Therefore, the above claim is non-statutory. For further information, see interim Guidelines for Examination of Patent Application for Patent Subject Matter Eligibility (Signed 26Oct2005) –OG Cite: 1300 OG 142. <<http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm>>

Claims 17-19:

Claims 17-19 depend on claim 16. These claims all fail to remedy the 35 U.S.C 101 nonstatutory problem of claim 16. Therefore, they are also rejected for the same reason.

--These rejections can be overcome by changing the "machine-accessible medium" to "non-transitory computer-readable storage medium" which is a tangible physical article or object and thus is statutory.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (Li et al., US 2005/0108695A1) in view of Lauterbach (Gary R. Lauterbach, US 5,712,791)

Claim 1:

Li discloses a computer implemented method for rearranging a computer program comprising:

- organizing the computer program into a plurality of blocks (basic blocks) (see for example, pg [0039], "Fig.5 is a flowchart illustrating a method 500 for thread-partitioning a sequential application program"; also see Fig.2A-2C and related text; also see paragraph [0045], "CFG nodes are basic blocks...and the edges represent possible flow of control between basic blocks" and related text);
- determining a critical section of the computer program (see for example, Fig.5, step 510 "...identified critical sections of the sequential application program within pairs of boundary instructions" and related text);
- constructing a control flow graph based on the organization of the computer program (see for example, Fig.5, step 502, "Build a control flow graph (CFG)

- for a loop body of sequential application program to form a CFG loop” and related text; also see paragraph [0045], “CFG nodes are basic blocks...and the edges represent possible flow of control between basic blocks” and related text) ;
- recognizing a portion of the computer program that could be executed outside of the critical section (see for example, paragraph [0046], “...code motion moves irrelevant code out of identified critical section...motion candidate instructions are identified using dataflow analysis” and related text)
 - inserting a plurality of dependency relationships between the plurality of blocks to cause execution of the recognized portion of the computer program outside of the critical section (see for example, paragraph [0046], “...code motion is a technique for inter-block and intra-block instruction reordering (hoisting/sinking)...code motion moves irrelevant code out of identified critical sections in order to minimize the amount of instruction/operations contained therein”)

Li also discloses using a dependency graph of the sequential application program (see for example, Fig.9 , step 551 “Hoist motion candidate instructions in a source basic block of the CFG Loop according to a dependence graph of the sequential application program), but Li discloses not explicitly discloses constructing the dependency graph based on the organization of the computer program. However, Lauterbach in the same analogous art discloses generate dependency graph based on instructions (see for example, Col.3, lines 26-27,

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“...the dependency graph generator generates a dependency graph for a set of program instruction”; Fig.2, step 50, “Build Dependency Graph for Trace of instructions” and related text; also see Fig.3 illustrates a dynamic dependency graph associated with a set of program instructions). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the dependency graph using Lauterbach’s method. One would have been motivated to do so to generate a dependency graph of the sequential application program as explicitly required by Li (see for example, Fig.9 step 551 and Fig.12, step 576, “Sink motion candidate instructions within basic blocks containing advance instruction according to a dependence graph of the sequential application program”)

Claim 2:

Li discloses the method of claim 1 wherein each of the plurality of blocks includes computer program instructions (see for example, Fig.2A-C), but does not explicitly disclose contain a computer program instruction. However, Lauterbach discloses generate dependence graph based on the input instructions. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to organize the block of the computer program as implementation required.

Claim 3:

Li discloses the method of claim 1 further comprises organizing the computer program based on a node and a super block, wherein the node includes a plurality of blocks and the super block includes a plurality of nodes (see for example, Fig.2A-C, Fig.3A-B).

Claim 4:

Li discloses the method of claim 1, wherein the critical section of the computer program accesses shared resources (loop carried variables) (see for example, paragraph [0034], “each loop carried variable is assigned within a unique critical section to synchronize access to the loop carried variables in order to form program-thread...”).

Claim 5:

Li discloses the method of claim 1 further comprises comprising determining to the extent the critical section is part of the dependency graph (see for example, Fig3A-B item 322 and 324 and related text; also see Fig.5 step 520, “corresponding pairs of bonding instructions” and related text).

Claim 6:

Li discloses the method of claim 5 further comprises comprising adding a termination point to the critical section if a portion of the critical section is outside of the dependency graph (see for example, Fig.3B, item 328 and related text).

Claim 7:

Li discloses the method of claim 1, but does not explicitly disclose inserting additional dependency relationship based on a direct dependency, an indirect dependency, or a shortest life-time dependency. However, Lauterbach in the same analogous art discloses insert artificial dependencies into the generated dependency graph (see for example, Fig.2, step 56 “Insert Artificial dependencies into dependency graph”). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Lauterbach’s method to insert additional dependency relationship to add additional limitations as suggested Lauterbach (see for example, col.2, lines 11-13)

Claim 8:

Li discloses the method of claim 1 further comprises comprising scheduling to execute the computer program based on the dependency graph (see for example, Fig.16, step 594, “Concurrently execute the plurality of application threads within a respective thread of a multi-threaded architecture” and related text) .

Claims 9-12:

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Claims 9-12 are system version for performing the claimed method as in claims 1-8 addressed above, wherein all claimed limitation functions have been addressed and/or set forth above and certainly a computer system would need to run and/or practice such function steps disclosed by reference above. Thus, they also would have been obvious.

Claims 13-15:

Claims 13-15 are another system version for performing the claimed method as in claims 1-8 addressed above, wherein all claimed limitation functions have been addressed and/or set forth above and certainly a computer system would need to run and/or practice such function steps disclosed by reference above. Thus, they also would have been obvious.

Claims 16-19:

Claims 16-19 are computer program products version of the claimed method, wherein all claimed limitation functions have been addressed in claims 1-8 above respectively. It is well known in the computer art that such method steps can be implemented as computer program and can be practiced and /or stored on a machine-accessible medium. Thus, they also would have been obvious in view of reference teachings above.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zheng Wei whose telephone number is (571) 270-1059 and Fax number is (571) 270-2059. The examiner can normally be reached on Monday-Thursday 8:00-15:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature of relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571- 272-1000.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Z. W./
Examiner, Art Unit 2192

/Tuan Q. Dam/
Supervisory Patent Examiner, Art Unit 2192